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(1) A detonation arrester, unless both the marine VCS and the facility's main VCS only control vapors of cargoes that are non-flammable, non-combustible, or that have high flashpoints;

(2) Two fail-safe, quick closing valves, one on each side of any detonation arrester required by paragraph (a)(1) of this section, which automatically close when—

(i) A flame is detected on the detonation arrester;

(ii) The facility's marine VCS is not in operation; or

(iii) Vapor back flow to the marine vapor line is detected; and

(3) A means to prevent backflow of vapors to the marine vapor line.

(b) Vapors from facility processing areas unrelated to tank vessel operations must not enter the vapor line of a marine VCS before the devices required by paragraph (a) of this section.

(c) Except as specified by paragraph (d) of this section, a facility that wants to connect a facility vapor line, which collects vapor from other facility processing areas that are not related to tank vessel operations, to a marine VCS before the devices required by 33 CFR 154.2109(b)(1) and (2) and (c)(2), must receive approval in writing from the Commandant.

(d) A facility may connect a facility vapor line, which collects vapor from other facility processing areas that are not related to tank vessel operations, to a marine vapor line downstream of the devices required by 33 CFR 154.2109(b)(1) and (2) and (c)(2) to share the marine vapor destruction unit.

§ 154.2112 Vapors with potential to polymerize or freeze—Special requirements.

(a) A vapor control system (VCS) that controls vapors with the potential to polymerize at a normal ambient condition must—

(1) Be designed to prevent condensation of monomer vapor. Methods such as heat tracing and insulation are permitted if they do not result in an increased risk of polymerization;

(2) Be designed so that polymerization can be detected. Any points suspected of being sites for potential polymerization buildup must be equipped with inspection openings; and

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(3) Include devices to measure the pressure drop across detonation arresters due to polymerization. The devices should activate an alarm on high pressure drop to warn of polymerization. Any device used for this purpose, including differential pressure monitors, must not have the capability of transmitting a detonation across the detonation arrester.

(b) A VCS that controls cargo vapors that potentially freeze at ambient temperature must have a design that prevents the freezing of vapors or condensate at ambient temperature or that detects and removes the liquid condensate and solids to prevent accumulation.

§ 154.2113 Alkylene oxides—Special requirements.

A vapor control system (VCS) that controls vapors of an alkylene oxide, except for carriage under 46 CFR part 151 (listed in Table 151.05 with “Pressure” entry in the “Cargo identification, Pressure, b” column), must comply with paragraphs (a) and (b) of this section.

(a)(1) The VCS's equipment, hoses, piping, and all piping components, including valves, flanges, and fittings, must be of a type and constructed out of materials suitable for use with alkylene oxide;

(2) The VCS used for collecting an alkylene oxide vapor must not be used for collecting other vapors and must be separated from any other VCS, except as specified by paragraph (b) of this section; and

(b) The VCS must be adequately cleaned in accordance with 33 CFR 154.2150(p) and either recertified by a certifying entity or approved by a marine chemist if—

(1) The VCS is used to control other vapors; or

(2) The VCS is returned to alkylene oxide service after being used to control other cargo vapors.

TRANSFER FACILITIES—OPERATIONS

§ 154.2150 General requirements.

(a) No transfer operation using a vapor control system (VCS) may be conducted unless the facility operator has a copy of the facility operations

manual, with the VCS addendum, marked by the local Coast Guard Captain of the Port (COTP) as required by 33 CFR 154.325(d).

(b) Personnel in charge of a facility must ensure that—

(1) The facility controls vapor only from cargoes that are properly authorized for vapor control in the facility's certification letter;

(2) The facility transfers vapor only to or from a vessel that has its certificate of inspection or certificate of compliance endorsed in accordance with 46 CFR 39.1013 or 46 CFR 39.1015 for each cargo intended for transfer; and

(3) If the vessel tanks to be vapor controlled contain vapor from previous cargo transfers other than the cargo or cargoes intended for transfer, the facility and vessel must be authorized to control the additional vapor from the previous cargo transfers. Any oxygen or hydrocarbon analyzer alarm and shutdown setpoints must be set to accommodate all of the cargo vapors.

(c) The facility personnel in charge must ensure that safety system testing is conducted as follows:

(1) Pressure sensors, alarms, and automatic shutdown systems required by 33 CFR 154.2103, 154.2107, and 154.2110, except as exempted by paragraph (c)(2) or specified by paragraph (c)(3) of this section, must be tested by applying altering test pressures at the sensors not more than 24 hours before each transfer;

(2) The pressure sensors required by 33 CFR 154.2103 may meet the requirements of the test program contained in 33 CFR 154.2180 and 33 CFR 154.2181 instead of the current program, which mandates tests within 24 hours before each transfer as required by paragraph (c)(1) of this section;

(3) Visible and audible alarm indicators must be tested not more than 24 hours before each transfer;

(4) The analyzers, except for flammability analyzers, required by 33 CFR 154.2105, 154.2107, and 154.2110, except as exempted by paragraph (c)(5) of this section, must be checked for calibration response by using a zero gas and a span gas not more than 24 hours before each transfer;

(5) The analyzers required by 33 CFR 154.2105, 154.2107, and 154.2110 may be

checked for calibration response by use of a zero gas and a span gas as defined by the test program contained in 33 CFR 154.2180 and 33 CFR 154.2181, and comply with the minimum requirements as defined in 33 CFR 154.2180 and 33 CFR 154.2181, instead of the test required by paragraph (c)(4) of this section; and

(6) The vacuum and pressure relief valves required by 33 CFR 154.2103 must be manually checked per manufacturers' instructions to verify that the valves unseat easily and then reset to the closed position without constraint. Any required flame screens or flame arresters must also be visually checked to ensure that they are not damaged.

(d) The proper position of all valves in the vapor line between the vessel's tanks and the facility vapor collection system must be verified before the start of the transfer operation.

(e) A tank barge overfill control system that meets the requirements of 46 CFR 39.2009(a)(2) must—

(1) Not be connected to an overfill sensor circuit that exceeds the system's rated inductance and capacitance; and

(2) Be tested for proper operation after connection is made with the vessel by simulating liquid high level and overfill at each tank.

(f) When receiving vapor from a vessel with cargo tanks that are required to be inerted in accordance with 46 CFR 32.53, 46 CFR 153.500, or 46 CFR Table 151.05, the remotely operated cargo vapor shutoff valve required by 33 CFR 154.2101(a) must not be opened until the pressure at the facility vapor connection, downstream of the facility vapor connection, exceeds 0.2 pounds per square inch gauge (psig).

(g) The initial cargo transfer rate must not exceed the rate agreed upon at the pre-transfer conference and 46 CFR 39.3001(g).

(h) The cargo transfer rate must not exceed the maximum allowable transfer rate as determined by the lesser of the following:

(1) A transfer rate corresponding to the maximum vapor processing rate for the VCS, as specified in the facility operations manual; or

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(2) The vessel's maximum transfer rate in accordance with 46 CFR 39.3001(d).

(i) While transferring cargo to a vessel connected to a VCS, compressed air or gas may be used to clear cargo hoses and loading arms, but must not be used to clear cargo lines. However, compressed inert gas such as nitrogen can be used to clear cargo lines if a pigging system that meets 33 CFR 154.2104 is provided.

(j) If a pigging system is used to clear cargo lines to the tank vessel while the vessel is connected to the facility VCS, the following operational requirements apply:

(1) The VCS must be in operation, with all of the high-pressure alarms and shutdowns required by 33 CFR 154.2103 active, before and during pigging operations;

(2) Personnel performing the pigging operation must be adequately trained on the specific pigging system being used. Accurate written procedures that address event sequence, equipment, safety precautions, and overpressurization hazards must be made available to all personnel involved in the pigging operations;

(3) Pigging procedures must be reviewed by both the vessel and facility personnel in charge as part of the pre-transfer conference. Topics of discussion during the pre-transfer conference must include, but need not be limited to—

- (i) Event sequence;
- (ii) Equipment;
- (iii) Safety precautions;
- (iv) Overpressurization hazards;
- (v) Personnel roles;
- (vi) Gas volumetric flow rates;
- (vii) Gas pressures;
- (viii) Volume of residual cargo in the line;
- (ix) Amount of ullage space that is available for line displacement and connections;
- (x) Valve alignment;
- (xi) Units of measure;
- (xii) Terminology; and
- (xiii) Anticipated duration of the evolution;

(4) The pig must be inspected to ensure that it is of sufficient durability and condition; be of an appropriate size, type, and construction for the in-

tended operation; and be inspected for defects before each use and replaced if necessary;

(5) Personnel performing pigging operations must monitor pig movement at all times. The facility and vessel manifold valves must be closed immediately after the pig reaches the pig-receiving device; and

(6) If the pigging system contains pressure-sensing, relieving, or alarming components in addition to those required by 33 CFR 154.2103, the components must be periodically tested in accordance with paragraphs (c) and (q) of this section.

(k) If one or more analyzers required by 33 CFR 154.2107(d) or (e) or 154.2110 become inoperable during a transfer operation, the operation may continue, provided that at least one analyzer remains operational; however, no further transfer operations may start until all inoperable analyzers are replaced or repaired.

(l) Whenever a condition results in a shutdown of the VCS, the emergency shutdown system required by 33 CFR 154.550 must be automatically activated to terminate cargo loading into tanks which are being vapor controlled.

(m) If it is suspected that a flare in the VCS has had a flashback, or if a flame is detected on a detonation arrester required by 33 CFR 154.2109(c)(2), the transfer operation must stop and cannot restart until that detonation arrester and any quick-closing stop valves downstream of the detonation arrester are inspected and found to be in satisfactory condition.

(n) Before each transfer operation, the freezing point of each cargo must be determined. If there is a possibility that the ambient air temperature during transfer operations will be at or below the freezing point of the cargo, adequate precautions must be taken to prevent freezing of vapor or condensate, or to detect and remove the frozen liquid and condensation to prevent accumulation.

(o) Before each transfer operation, the cargo vapor must be evaluated to determine its potential to polymerize, and adequate precautions must be taken to prevent and detect polymerization of the cargo vapors.

(p) Mixing of incompatible vapors is prohibited. The VCS piping, equipment, hoses, valves, and arresters must be purged between vapor control operations that involve incompatible chemical vapors in accordance with the following:

(1) Chemical compatibility must be determined by using the procedures contained in 46 CFR part 150;

(2) Purge gas must be an inert gas, air, or enriching gas, and must be adequate to reduce the level of residual vapor to a level at which reaction with the subsequent vapor cannot occur; and

(3) The required duration of purge time must be calculated and approved by the certifying entity during the certification or recertification.

(q) After each transfer operation, the VCS piping, equipment, hoses, valves, and arresters must be purged with at least two-system volume exchanges of non-reactive gas or air so the VCS is left with a safe condition.

(r) VCS equipment and instrumentation must be tested in compliance with 33 CFR 156.170(g) or (i), with the COTP or designated representative invited to observe these tests. The test procedure and a checklist must be approved by the certifying entity during the initial certification of the system and incorporated into the facility operations manual.

(s) A transfer operation that includes collection of vapor emitted to or from a vessel's cargo tanks must meet the transfer requirements of 33 CFR 156.120(aa), and a declaration of inspection meeting the requirements of 33 CFR 156.150 must be completed before each transfer.

ALTERNATIVE ANALYZER AND PRESSURE SENSOR RELIABILITY TESTING

§ 154.2180 Alternative testing program—Generally.

(a) As an alternative to complying with the vapor control system (VCS) analyzer and pressure sensor safety testing requirements provided by 33 CFR 154.2150(c) and 33 CFR 154.2250(c), the facility person in charge may administer a reliability assurance test program in accordance with this section and 33 CFR 154.2181.

(b) As used in this section—

(1) *Calibration drift* or *CD* means the difference in the analyzer output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place;

(2) *Calibration error* or *CE* means the difference between the gas concentration exhibited by the gas analyzer and the known concentration of the cylinder gas;

(3) *Response time* or *RT* means the time interval between the start of a step change in the system input (e.g., change of calibration gas) and the time when the data recording system displays 95 percent of the final stable value; and

(4) *Sampling system bias* or *SSB* means the difference between the gas concentrations indicated by the measurement system when a known cylinder gas is introduced at or near the sampling probe and when the same gas is introduced directly to the analyzer.

(c) All analyzers used in a VCS must be tested for safety system functions, CE, CD, RT, and SSB, in accordance with 33 CFR 154.2181.

(d) All pressure sensors/switches used in a VCS must be tested for safety system functions, CE and CD, in accordance with 33 CFR 154.2181.

(e) The facility person in charge must ensure the following:

(1) Calibration of instrumentation using standard procedures provided by the manufacturer or service provider;

(2) Monitoring of all interlocks, alarms, and recording devices for proper operation while instrumentation is being calibrated;

(3) Use of a certified gas standard that is within plus or minus two (2) percent of its certified concentration to calibrate the analyzers; and

(4) Use of a certified secondary standard that is standardized against a primary standard to calibrate the pressure sensors/switches.

(f) Upon failing any test under 33 CFR 154.2181, the facility person in charge must ensure that all monthly and quarterly tests, including CE, CD, RT, and SSB, are conducted; and until all quarterly tests are completed, the person in charge must ensure that the vapor control alarms and automatic